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In this preparation the distribution of the ganglia and nerves over the entire surface of the heart, and the relations of these structures to the blood-vessels and muscular substance, are considered by the author to be far more fully displayed than in any of his former dissections. He states, that on the anterior surface there are distinctly visible to the naked eye, ninety ganglia or ganglionic enlargements on the nerves, which pass obliquely across the arteries and the muscular fibres of the ventricles from their base to the apex; that these ganglionic enlargements are observed on the nerves, not only where they are crossing the arteries, but where they are ramifying on the muscular substance without the blood-vessels; that on the posterior surface the principal branches of the coronary arteries plunge into the muscular substance of the heart near the base, and many nerves with ganglia accompany them throughout the walls to the lining membrane and columnæ carneæ.

The author considers that, in the accompanying beautiful drawings, Mr. West has depicted with the greatest accuracy and minuteness the whole nervous structures demonstrable in this preparation on the surface of the heart; but that the ganglia and nerves represented in these drawings constitute only a small portion of the nervous system of the heart, numerous ganglia being formed in the walls of the heart which no artist can represent.

4. "On the Aurora Borealis which occurred on the evening of Friday, the 17th of November, 1848." By Mr. R. Smith, Blackford, Perthshire. Communicated by P. M. Roget, M.D., F.R.S.

The author states that the 17th of November was a fine day with a clear sky and bright sunshine: towards evening the sky became cloudy and a few drops of rain fell, but it soon again became clear, with the exception of a few fleecy clouds that here and there dimmed its brightness. At 6^h 45^m a soft and gentle light began to illumine the northern region of the sky; and at 7 o'clock a considerable portion of it was covered with dark-red streams of light towards the east; while streamers moving to and fro, arrayed in colours of golden and silvery hues, overspread the south and north. About 8 o'clock there appeared near the zenith, and upon the magnetic meridian, a ring of an elliptical form, from which proceeded in all directions towards the horizon, beams or columns of light, giving to the heavens the appearance of a splendid vault, with its top adorned with a crown or wreath; while around and within the vault were to be seen clouds of brilliant light flashing towards and from the crown or central circle of the aurora, sometimes tinged with prismatic rays, at other times intensely white and lucid. About half-past nine nearly the whole of the aerial canopy was clad with clouds of a bright red colour, casting a curious reddened hue over the objects on the surface of the earth. After a short period of time had elapsed, the red colour began to diminish in intensity, and was again replaced by the white dome. However, in various parts of the sky the red colour still remained, principally in the north-west, south-west, and north-east. Between the hours of twelve and one beams

of brilliant white light commenced shooting up in the south from the horizon to the central ring or pole. The beams appeared to be at nearly equal distances from each other, the entire column of them stretching over a space equal to about one-fifth part of the visible horizon, in the form of a fan. The whole figure rapidly changed from a pure white light into a glow of brilliant colours of every tint, variegating the undulating waves as they rolled on their way to the pole of the aurora. In the course of three minutes these gave place to the white flashing radiations.

During the time of the aurora there were a great number of small meteors, the direction of whose motion was from east to west, and which appeared to be considerably below the sphere of the aurora.

A box containing a delicately balanced needle, was exposed upon the ground during the display of the aurora, but did not appear to be affected in the slightest degree till about one o'clock, when it was observed to be considerably deflected. At the time when the needle was disturbed, there was a dense column of radiating light in the north-west and south-east. The reflexion from the north-west was so clear, that when made to fall upon the polarizing plate of M. Biot's polarizing apparatus, and a film of mica was placed upon the stage of the instrument, the various colours produced by the mica were beautifully clear and distinctly seen in the analysing glass.

The author considers that the phenomenon of the colours which were noticed, was probably caused by exhalations or vapour floating in the atmosphere, betwixt the light of the aurora and the observer, causing a refraction of the rays transmitted to the eye, analogous to that which produces the phenomenon of halos. The continued undulations of the auroral light, and also the passing of the rays through thick and thin portions of the vapour, may, he considers, have produced the great variety of colours. During the time of the exhibition of this phenomenon, a thin fog or vapour was observed on both sides of the auroral fan. The author is of opinion that the cause which produced the variety of tints, is different from that which occasioned the red-coloured auroral clouds. At the time of the latter phenomenon the moon's position was nearly due east, and a cloud moved from the west towards the east, which in its course passed between the moon and the observer; as soon as the cloud obscured the light of the moon, the red colour to the north-west disappeared, but became visible when an opening in the cloud allowed the rays to pass through, and again vanished when another portion of the cloud cut off the light; and when the cloud had finally passed over, the red colour in the different parts of the sky resumed the same tint that it possessed before the moonlight was obscured by the cloud. The author states that it would thus appear, that when the light of the moon was incident at a certain angle upon the white light, or some kind of vapour that surrounded it, a red colour was produced; and hence that the moon is in some way or other connected with the phenomenon. He remarks, that the red colour was first observed in the east, and the moon being in that quarter of the heavens, the rays proceeding from it would first come in

contact with that part of the aurora towards the east. When the aurora commenced, the moon was considerably below the horizon; but this, it is considered, does not form any serious objection to what has been stated, since the aurora soared to so great a height, that the rays of light proceeding from her would strike the aurora a considerable time before she arose above the horizon.

The aurora continued for upwards of six hours, and during that time the thermometer stood at 34°.

January 18, 1849.

The MARQUIS OF NORTHAMPTON, V.P., in the Chair.

A paper was read, entitled "On the Development and Homologies of the Carapace and Plastron of the Chelonian Reptiles." By Professor Owen, F.R.S.

The author commences by defining the several parts of which the osseous thoracic-abdominal case of the Chelonian Reptiles is composed, and briefly discusses the several opinions that have been published with regard to their nature and homologies, dwelling chiefly on that recently proposed by Prof. Rathké, in his work on the Development of the *Chelonia*, in which it is contended that the carapace consists exclusively of the development of parts of the endo-skeleton, viz. the neural spines and vertebral ribs (*pleurapophyses*), agreeably with the opinion of CUVIER and BOJANUS, and that the remainder of the thoracic-abdominal case, consisting of the "marginal pieces" and "plastron," are formed entirely from bones of the dermal system.

Adverting to the hypotheses of Cuvier, Geoffroy and Meckel, that the thoracic-abdominal case is a modification of parts of the endoskeleton exclusively, the author tests their determinations by comparisons with the corresponding parts of the bird and crocodile, and infers, from the latter animal, that the hyosternal, hyposternal and xiphisternal bones are not parts of the sternum, but are homologous with the hemapophyses (sternal ribs and abdominal ribs); those in the *Plesiosaurus* making the nearest approach to the peculiar development of the parts in the *Chelonia*, especially as they appear in the plastron of the immature Terrapenes and Sea-turtles.

Admitting that any hypothesis framed from the comparison of the completed structures in the adult Vertebrata requires for confirmation its agreement with the important phenomena of the development of those structures, the author proceeds to apply that test.

He details his observations on the development of the skeleton, and especially of the thoracic-abdominal case, in the embryos and young of different genera of *Chelonia*. The chief facts that have governed his conclusions are the following:—

With respect to the carapace. The cartilaginous basis of the neural plates is developed in the substance of the derm; and of